

Teacher Education in a Workplace Learning Environment: Distinctive Characteristics of Powerful Workplace Learning Environments within Primary Teacher Education¹

Jeannette J.M. Geldens, Kempel Research Center, University of Professional Teacher Education De Kempel

Herman L. Popeijus, Kempel Research Center, University of Professional Teacher Education De Kempel

ABSTRACT: This article reports on research in the Netherlands to determine the distinctive characteristics of powerful workplace learning environments within primary teacher education. Nationally and internationally, educational competence-based models and so-called workplace learning environments are widely seen as promising alternatives in professional teacher education. The workplace learning environment as defined by Geldens (2007) consists of one or more Professional Development Schools and (almost always) one university for professional teacher education. It is a logical consequence of her notion that the only way to provide highly qualified teaching professionals is by means of collaboration between a university of teacher education and one or more Professional Development Schools. The main purpose of the research was to obtain a coherent representation of the characteristics of workplace learning environments for primary teacher education. A second purpose was to gain insight as to the characteristics that make learning how to teach in a workplace learning environment "powerful." A third purpose was to gain insight into the structure and content of mentoring conversations within the workplace learning environment.

NAPDS Essentials Addressed: #2/A school–university culture committed to the preparation of future educators that embraces their active engagement in the school community; #4/A shared commitment to innovative and reflective practices by all participants

¹This article provides an adjusted resume of Geldens' dissertation (Geldens, 2007).

Introduction

Problem Description

In the past decade the conventional methods of professional primary teacher education have been subjected to criticism, nationally and internationally. Underlying reasons for this criticism are changing theories of learning as well as changing expectations of society (Deinum, Maandag, Hofman, & Buitink, 2005; Grossman, 2006). Current theories emphasize the importance of new educational competence-based models and so-called workplace learning environments in primary teacher education. Nationally and internationally, these new models and environments are seen as promising alternatives in professional teacher education (Abdal-Haqq, 1998; Bassi, Cheney, & Lewis 1998; Mantle-Bromley, 2003; Smith, 2003; Torraco, 1999).

Thus, the institutions for primary teacher education in the Netherlands are developing and implementing new educational competence-based models. In these models, the workplace learning environment plays a central role (ATEE/RDC 2001; Bronneman-Helmers, 1999; Leune, 1999; OECD, 2001). Therefore, we define workplace learning environments as more than solely learning at the workplace, but as an environment created by partnerships of primary schools and universities of professional teacher education in which prospective teachers can develop the necessary professional competencies in interactions between learning and working.

Creating "powerful" workplace learning environments is a complex educational innovation for the universities of professional teacher education and the primary schools. Furthermore, the information currently available in the literature regarding powerful workplace learning environments is scarce. The addition of the term "powerful" to a (workplace) learning environment is specifically related to the quality of the workplace learning environment (De Corte, 1990; Lode-

wijks, 1993; National Council for Accreditation of Teacher Education, 2001). Sometimes it is related to the efficiency of the education of teachers (De Corte, Greer, & Verschaffel, 1996).

In addition, the term powerful is used to emphasize the strong character of learning processes that occur within a workplace. These learning processes are presumed to be more powerful than learning processes within more traditional classroom settings at a university of professional teacher education (Bassi, Cheney, & Lewis, 1998; Kessels & Poell, 2001; Klarus, 1998; Torraco, 1999). To date, few research results are available to indicate which characteristics of such a powerful workplace learning environment enhance the learning of prospective teachers in their education.

Objectives

The main objective of our research was to obtain a coherent representation of the characteristics of workplace learning environments created for the education of prospective teachers. This representation consists of a conceptual analytical framework. The concepts of this framework make it possible to analyze, describe, and test for quality of existing workplace learning environments. The concepts should also enable the creation of new and the further development of existing workplace learning environments. A second objective, deduced from the main objective, was to gain insight as to the characteristics that make learning how to teach in a workplace learning environment powerful. A third objective concerns the fact that the education of teachers in a workplace learning environment includes characteristics of learning "off-the-job" as well as "on-the-job."

The prospective teacher faces the challenge of incorporating on-the-job learned teaching with theoretical insights into education. The prospective teacher supervision by her or his mentor appears to be crucial in

inducing a transfer between theory and practice (Berliner, 2001; Gallego, 2001; Korthagen & Kessels, 1999; Verloop, Driel, & Meijer 2001; Zeichner, 1999). In the mentor-mentee relationship, the meetings between mentors and prospective teachers play a central role. Therefore, the third objective of our study was to gain insight into the (qualitative) structure and content of their mentoring conversations within the workplace learning environment.

Research Questions

The above objectives yielded three research questions:

- 1) What are the characteristics of workplace learning environments for primary teacher education?
- 2) Which of these characteristics, in the opinion of the participants, define a “powerful” workplace learning environment?
- 3) How do the mentors utilize their supervision in the conversations with the prospective teachers?

Research Method

Pilot Study

First, we conducted a literature study to determine the current knowledge concerning the characteristics of workplace learning environments for learning how to teach prospective primary teachers. Next, through an empirical exploration we obtained an outline of characteristics of workplace learning environments. To do so, with the aid of concept mapping, we conducted a query in a group of professionals and a group of experts involved in workplace learning (Markham, Mintzes & Jones 1994; Morine-Dershimer 1993).

The results obtained by the literature study and the empirical exploration were combined. This resulted in a number of characteristics of workplace learning environments like integration of theory and practice, learning and working, collaboration, mentoring and modelling. From these characteristics, concepts were derived that we used as “sensitizing or guiding concepts” to analyze the interviews for the main study (Peters 2001; Wester 1995; Wester & Peters 1999).

Main Study

In addition to the literature study and empirical exploration, we conducted a multiple case study. This multiple case study was comprised of two separate case studies conducted sequentially using semi-structured interviews. Two workplace learning environments were created by a university of professional teacher education in association with two primary schools. In the first case study, the workplace learning environment was created for two prospective teachers who arrived with work experience and a certificate from another university of professional education. In the second case study, the workplace learning environment was created for two regular prospective teachers. In each of the two case studies, twelve different participants were directly involved in the work-based learning stages.

Semi-structured interviews took place in the beginning and at the end of each work-based learning stage (taking five to six months); the participants were questioned about the characteristic properties of the workplace learning environment.

Data Analysis

Using the computer program Kwalitan, which was developed especially for qualitative research (version 5.09, Hijmans & Peters, 2000; Peters, 2001; Wester & Peters, 1999), we analyzed 48 interview transcriptions. A grounded theory approach was used for

analysis (Glaser & Strauss, 1976; Strauss & Corbin, 1990; Swanborn, 1994; Wester & Peters, 2004). The “sensitizing concepts” obtained in the empirical exploration were employed to develop a coding system.

A cyclic process of coding, assigning new keywords, and again coding continued until the coding produced no new insight and keywords (saturation). This was the case after analyzing fourteen interviews. In this manner, we built an extensive coding system by which the research material was sufficiently exhausted. Results of the data analysis of the interviews from both cases served to develop a conceptual analytical framework with the characteristic properties of workplace learning environments. Comparisons between this framework and current theoretical ideas concerning those characteristics then took place (Swanborn, 2003; Yin, 1994).

We also searched for answers to the second research question: which of these characteristics, in the opinion of the actors, define a “powerful” workplace learning environment? We analyzed 48 interviews on the importance and interest the respondents assigned to the element or characteristic. The quality of the mentoring conversations were examined three times in each case. For this purpose a total of 22 conversations were recorded and analyzed as to the phases of the conversations, the main activities, and the taking of initiative. We also determined whether the quality of mentoring conversations could be dependent upon the duration of these conversations.

Results

Characteristics of Workplace Learning Environments for Primary Teacher Education

The purpose of the first research question was to determine the characteristics of workplace learning environments for primary teacher

education. We accomplished this by conducting a literature study, an empirical exploration and a multiple case study. We compared the results of the literature study and the empirical exploration; this produced a similar outcome, with some minor exceptions.

Twenty characteristics of workplace learning environments were identified. The descriptions of the characteristics allowed us to use these concepts as “sensitizing concepts” for analyzing the interviews from the first case to develop a coding system. We recognized nineteen of these twenty characteristics in the multiple case study. Interestingly, one characteristic was not recognized, “the harmony in a workplace learning environment between virtual and physical functions.” Therefore, we disregarded this characteristic in further analysis of the data.

An important outcome of the multiple case study, in regard to the literature study and the empirical exploration, is that we were able to develop a coherent conceptual analytical framework providing a fairly complete picture of the characteristic properties of workplace learning environments. This framework allowed the user to not only analyze and register existing workplace learning environments and to test them for completeness, but also to create new ones. The conceptual analytical framework is based on 104 elements that constitute the characteristic properties of a workplace learning environment. We categorized these elements, on the basis of affinity, in nineteen characteristics and grouped these characteristics into seven components to obtain a logically coherent conceptual analytical framework. Table 1 gives a summary of the components and characteristics of this framework.

The first component, educational activities, refers to a balanced program of essential elements of knowledge, skills and attitudes that the prospective teacher has to acquire within the workplace learning environment. The workplace learning environment provides the prospective teacher with a balance

Table 1. Summary of the Components and Characteristics of a Workplace Learning Environment

No.	Component	No.	Characteristic
1	Educational activities	1	Balance of theory and practice
		2	Continuity
2	Learning climate	3	Emotional security
		4	Challenge and stimulation
3	Professionalism	5	Learning organization
		6	Professional development
		7	Self-management
4	Conditions	8	Facilitation
		9	ICT utilization
		10	Human resources
		11	Cooperation agreements
		12	Up-to-date equipment
5	Supervision	13	Adaptation to needs
		14	Characteristic situations
		15	Mentoring and coaching
		16	Providing ownership
6	Quality control	17	Process management
		18	Self-evaluation
7	Initial competence	19	Competences

between theory and practice (characteristic 1) and a continuity (characteristic 2) of the educational activities; both play a role in the development of the prospective teacher to obtain the necessary competences.

The second component, learning climate, is comprised of emotional security (characteristic 3) and challenge and stimulation (characteristic 4) within the workplace learning environment. Professionalism is the third component; it includes characteristic properties related to a learning organization (characteristic 5), and to the professional development (characteristic 6) and self-management (characteristic 7) of the participants.

The fourth component, conditions, is related to conditional properties that are described as facilitation (characteristic 8), ICT utilization (characteristic 9), and up-to-date equipment (characteristic 12). Furthermore, this component is characterized by an efficient implementation of human resources (characteristic 10) that are necessary for

education of the prospective teacher. There is also the presence of cooperation agreements (characteristic 11) between the partners.

The fifth component, supervision, includes the adaptation to the needs (characteristic 13) of the prospective teacher and the learning of characteristic situations (characteristic 14) with the aid of mentoring and coaching (characteristic 15) as supervising and supporting activities. These activities are aimed at providing ownership (characteristic 16) which is necessary for a prospective teacher to become master of his own learning process.

The sixth component, quality control, includes systematic control of the quality of the work-based learning stages within the workplace learning environment. This control concerns primarily a form of process management (characteristic 17) to systematically follow the development of the prospective teacher. Because of the emphasis on self-management and responsibility of the prospective teacher, this component includes reflecting activities by the prospective teacher, described as self-evaluation (characteristic 18).

The last component, initial competence, has a special position within the conceptual analytical framework. Its characteristic properties are directly related to acquiring the competences (characteristic 19) necessary to become a teacher. Acquisition of this component is either the ultimate objective (to acquire goal-oriented competences) or the result (when the initial competence has been acquired) of each workplace learning environment. Therefore, the initial competence always targets and directs the contents and the design of the workplace learning environment.

Characteristics That Make a Workplace Learning Environment "Powerful"

The second research question was to determine which of the characteristics, in the opinion of the participants, define a powerful workplace learning environment. As de-

scribed earlier, the term powerful is related to the quality of the workplace learning environment and to the efficiency of educating prospective teachers. Therefore, the characteristic properties that result in such a powerful workplace learning environment were empirically induced, based on opinions expressed by the actors during the interviews.

From the analyses it appeared that the actors saw certain characteristic properties as crucial or decisive for educating teachers. The 48 interviews were analyzed separately on these specific properties. When it became qualitatively and quantitatively apparent to us that the participants considered a certain characteristic decisive, this characteristic was considered powerful.

A total of four of the nineteen characteristics from the conceptual analytical framework were considered powerful. These four characteristics are mentoring and coaching, competencies, continuity, and cooperation agreements. These four are, respectively, part of the components of supervision, initial competence, educational activities, and conditions.

When we combined the results of the first two research questions we concluded that a workplace learning environment can be adequately described with the elements, characteristics, and components we have defined. The relationship between the components is shown in Figure 1.

The arrows and lines in Figure 1 show in the first place a certain mutual dependency and a relationship between the components. Secondly they show the goal-orientated character of the components towards the initial competence. At the same time, the initial competence requirements provide direction and guidance for the components of the workplace learning environment.

Interestingly for the theory of the creation of powerful workplace learning environments, the central components "Initial competence," "Educational activities," and "Supervision" together with "Conditions" contain the

characteristics defined in our research results as powerful characteristics. We concluded that the creation of a workplace learning environment is influenced by the presence of the characteristics we have found, but foremost that the potentially powerful characteristics have the quality to stimulate the education of prospective teachers. We have pursued this for mentoring and, more specifically, for mentoring conversations.

The Quality of Mentoring Conversations

The third research question concerned the way in which mentors utilized their supervision in the conversations with the prospective teachers. Mentoring was identified as one of the four characteristics that stimulate a powerful workplace learning environment for teacher education. Within mentoring, the mentoring conversations are the most explicit form of supervision. However, of greater importance within a powerful workplace learning environment is not the fact that the mentoring conversations took place, but the quality of these conversations.

Therefore, we examined the quality of mentoring conversations as to the phases of the conversations, the main activities, and the taking of initiative. We explored the possibility that the quality of the conversations could be dependent on the duration of these conversations. We concluded that mentoring conversations show shortcomings concerning the variables in the conversational phases and the main activities, but also concerning the link between theory and practice. These shortcomings have direct impact on the quality of the conversations and the "power" of mentoring. They also result in restriction of the qualitative adaptation to the competences, the learning needs, and the possibilities of the prospective teacher herself or himself, at least in the mentoring conversations in our research.

If we look at the classification, in regard to the taking of initiative, of Feiman-Nemser

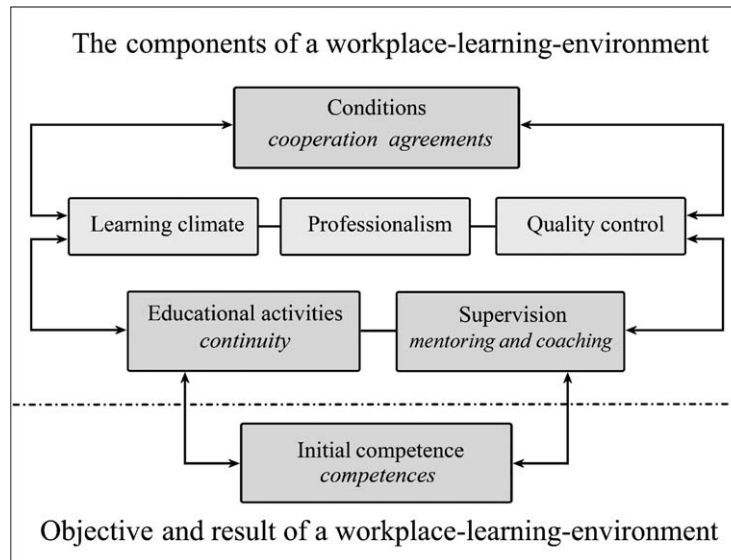


Figure 1. The Conceived Relationship Between the Components Regarding the Objective and Result of a Workplace Learning Environment. The Powerful Characteristics of the Components Are Shown in Italics

(1998) and that of Franke and Dahlgren (1996), we see in both cases more mentors that act instrumentally and directly than reflectively and personally. From the interviews, it became apparent that the participants estimated the time of their conversations to be about twice as long as they actually were. Therefore, we conclude that the actors' thinking does not always correspond with the actual situation. Although not definitive, based on the results, another conclusion is that as the length of the conversation increases, the more likely the chance that all the conversational phases and main activities in a mentoring conversation occur.

Our final conclusion, as to the conversational phases, the main activities, and the taking of initiative, is that there is no evidence of high quality mentoring conversations. This conclusion is in keeping with the literature concerning mentoring (Berliner, 2001; Gallego, 2001; Korthagen & Kessels, 1999; Zeichner, 1999). Mentoring has been designated as a potential powerful characteristic of the workplace learning environment. The last conclusion, however, also shows the vulnerability of this characteristic.

Discussion and Recommendations

The strength of the chosen research design was the layered construction of the research consisting of a literature study, an empirical exploration, a multiple case study, and a specific study on the quality of mentoring conversations. We have taken measures to guarantee the validity and reliability of the analysis.

Workplace learning environments are designed to stimulate new ways of learning how to teach by prospective primary teachers. The question we pose here is whether or not learning how to teach, the initial competence, really is the main objective during the creation and implementation of workplace learning environments in the education of prospective teachers. Our impression derived from the statements of the participants is that the design of the workplace learning environments, including the two we investigated, rests mainly on an organizational perspective. This means that workplace learning environments are designed from an educational perspective (first order changes) and, to a lesser degree, from a learning perspective (second order

changes). Our recommendation is to stimulate second order changes within workplace learning environments to change the primary processes within the organization of the workplace learning environments and to emphasize the learning perspective of the prospective teacher.

Based upon our research results, we have been able to integrate the fragmentary information found in the literature and form a coherent and complete picture of the characteristics of powerful workplace learning environments. As far as the impact of our research results, we wonder if various workplace learning environments can be analyzed and documented with the conceptual analytical framework we have developed. We examined workplace learning environments for the education of prospective primary teachers. We expect that the conceptual analytical framework can be used in workplace learning environments similar to the ones we have researched. We do not know to what extent our conceptual analytical framework can be applied to existing or new workplace learning environments in other educational sectors or even in other professional fields. More research is necessary to evaluate whether the conceptual analytical framework is applicable in diverse workplace learning environments.

With some adaptations or adjustments, the conceptual analytical framework can function as an instrument for measuring quality for existing or new workplace learning environments. For this reason, we recommend pedagogical centers or research departments of universities of professional teacher education to develop such an instrument for measuring quality and to make this instrument available for educational institutions. An initiative in this direction has already been taken by the "HBO-raad," the Netherlands counsel of universities of professional education ("quality indicators for school-based teacher education").

With regard to the phases of the conversations, the main activities, and the taking of initiative, we conclude that there is no evidence at present of high quality mentoring conversations. The education of prospective teachers in workplace learning environments is a vulnerable undertaking. Therefore, we recommend professionalizing mentors specifically for their mentoring task. Yet, it remains unclear whether prospective teachers educated in this way are better trained than when teacher education primarily originated from teacher training colleges. In our view, better educated means that these prospective teachers are better prepared to involve their pupils in entire learning processes. Further research is necessary to explore this assumption.

The concept "educating together" has made a rapid progress in the Netherlands. It is our opinion that it should be continued. The results of this research make it clear that "educating together" is an important innovation with a complex implementation. These insights are similar to results of research into the practices of the Professional Development Schools in the United States and school-based teacher education in England. But now we have a research-based conceptual framework at our disposal that contributes to the knowledge base of workplace learning and to the quality measurement of the workplace learning environment. ^{SUP}

References

- Abdal-Haqq, I. (1998). *Professional development schools. Weighing the evidence*. Thousand Oaks: Corwin Press.
- ATEE / RDC. (2001). *Scenarios for the future of Teacher Education in Europe*. Amsterdam: ATEE/RDC.
- Bassi, L., Cheney, S., & Lewis, E. (1998). Trends in workplace learning: Supply and demand in interesting times. *Training and Development*, 52(11), 51-77.
- Berliner, D. C. (2001). Learning about and learning from expert teachers. *International Journal of Educational Research*, 35, 463-482.

- Bronneman-Helmers, R. M. (1999). *Scholen onder druk. Op zoek naar de taak van de school in een veranderende samenleving*. Den Haag: SCP.
- De Corte, E. (1990). Ontwerpen van krachtige leeromgevingen. In M. J. Ippel & J. J. Elshout (Eds.), *Training van hogere-orde denkprocessen* (pp. 133-147). Amsterdam: Swets & Zeitlinger.
- De Corte, E., Greer, B., & Verschaffel, L. (1996). Mathematics teaching and learning. In D. C. Berliner & R. C. Calfee (Eds.), *Handbook of Educational Psychology* (pp. 491-549). New York: Macmillan.
- Deinum, J. F., Maandag, D. W., Hofman, A., & Buitink, J. (2005). *Aspecten van opleiden in de school. Een vergelijkend internationaal overzicht* (Studie Aspecten van opleiden in de school, uitgebracht aan de minister van Onderwijs, Cultuur en Wetenschap No. 20050383/839). Den Haag: Onderwijsraad.
- Feiman-Nemser, S. (1998). Teachers as teacher educators. *European Journal of Teacher Education*, 21(1), 63-74.
- Franke, A., & Dahlgren, L. O. (1996). Conceptions of mentoring: An empirical study of conceptions of mentoring during the schoolbased teacher education. *Teaching and Teacher Education*, 12(6), 627-641.
- Gallego, M. A. (2001). Is experience the best teacher? The potential of coupling classroom and community-based field experiences. *Journal of Teacher Education*, 52(4), 312-325.
- Geldens, J. (2007). *Leren onderwijzen in een werkplekleeromgeving. Een meervoudige casestudy naar kenmerken van krachtige werkplekleeromgevingen voor aanstaande leraren basisonderwijs* (Proefschrift Radbouduniversiteit Nijmegen). Helmond: Kempellectoraat, Hogeschool de Kempel.
- Glaser, B. G., & Strauss, A. L. (1976). *Time for dying*. Chicago: Aldine.
- Grossman, P. (2006, 10 mei). *From crisis to opportunity: new directions in research on teacher education*. Paper presented at the Onderwijs Research Dagen 2006, Amsterdam.
- Hijmans, E., & Peters, V. (2000). Grounded theory in media research and the use of the computer. *Communications*, 25(4), 407-432.
- Kessels, J. W. M., & Poell, R. F. (Eds.). (2001). *Human resource management. Organiseren van het leren*. Alphen aan den Rijn: Samson.
- Klarus, R. (1998). *Competenties erkennen. Een studie naar modellen en procedures voor leerwegaafhankelijke beoordeling van beroepscompetenties* (Proefschrift Katholieke Universiteit Nijmegen). 's-Hertogenbosch.
- Korthagen, F. A. J., & Kessels, J. (1999). Linking practice and theory: Changing the pedagogy of teacher education. *Educational Researcher*, 28(4), 4-17.
- Leune, H. (1999). *Onderwijs in beweging. Enige opmerkingen over veranderingen in het Nederlandse onderwijs gedurende het laatste kwart van de twintigste eeuw*. Den Haag: SCP.
- Lodewijks, J. G. L. C. (1993). *De kick van het kunnen: over arrangement en engagement bij het leren*. Unpublished inaugurele rede, MesoConsult, Tilburg.
- Mantle-Bromley, C. (2003). The status of early theories of professional development school potential. In I. N. Guadarrama, Ramsey John & J. L. Nath (Eds.), *Forging alliances in community and thought. Research in professional development schools* (Vol. I, pp. 3-30). Greenwich: Information Age Publishing Inc.
- Markham, K. M., Mintzes, J. J., & Jones, M. G. (1994). The concept map as a research and evaluation tool: Further evidence of validity. *Journal of Research in Science Teaching*, 31(1), 91-101.
- Morine-Dersheimer, G. (1993). Tracing conceptual change in preservice teachers. *Teaching and Teacher Education*, 9, 15-26.
- National Council for Accreditation of Teacher Education. (2001). *Standards for professional development schools* (report). Washington, DC: NCATE.
- OECD. (2001). *Schooling for Tomorrow. What schools for the future*. Paris: OECD.
- Peters, V. (2001). *Rondleiding door Kwalitan 5.0*. Nijmegen: Katholieke Universiteit Nijmegen, afdeling Methoden.
- Smith, P. J. (2003). Workplace learning and flexible delivery. *Review of Educational Research*, 73(1), 53-88.
- Strauss, A. L., & Corbin, J. (1990). *Basics of qualitative research: Grounded theory, procedures and tactics*. London: Sage Publications.
- Swanborn, P. G. (1994). *Methoden van sociaal-wetenschappelijk onderzoek*. Meppel: Boom.
- Swanborn, P. G. (2003). *Case-study's: wat, wanneer en hoe?* Amsterdam: Boom.
- Torraco, R. J. (1999). Integrating learning with working: A reconception of the role of workplace learning. *Human Resource Development Quarterly*, 10, 249-270.

- Verloop, N., Driel, J. H. v., & Meijer, P. (2001). Teacher knowledge and the knowledge of base of teaching. *International Journal of Educational Research*, 35(5), 441–461.
- Wester, F. (1995). *Strategieën voor kwalitatief onderzoek*. Bussum: Coutinho.
- Wester, F., & Peters, V. (1999). Kwalitatieve analyse van interviews: fasen, stappen en computergebruik in intensief onderzoek. *Pedagogische Studiën*, 76, 117–131.
- Wester, F., & Peters, V. (2004). *Kwalitatieve analyse. Uitgangspunten en procedures*. Bussum: Coutinho.
- Yin, R. K. (1994). *Case study research. Design and methods* (Second ed. Vol. 5). London: Sage Publications.
- Zeichner, K. M. (1999). The new scholarship in teacher education. *Educational Researcher*, 4–15.



Jeannette J.M. Geldens is professor of the Kempel Research Center at the University of Applied Sciences ‘De Kempel’ in Helmond (the Netherlands) and researcher at the University of Technology - Eindhoven

School of Education (TUE-ESoE). Her research interests are meaningful learning and teaching of prospective teachers in primary education in communities of learners within a workplace learning environment. She is an expert in design-based research, qualitative research, primary education and in teacher education.

Herman L. Popeijus is professor em., h.c. of the Kempel Research Center at the University of Applied Sciences ‘De Kempel’ in Helmond (the Netherlands) and researcher at the University of Technology - Eindhoven School of Education (TUE-ESoE). His research interests are meaningful learning and teaching of prospective teachers in primary education in communities of learners within a workplace learning environment. He is an expert in design-based research, quantitative research, educational laws and regulation, primary education and in teacher education.